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Periconia notabilis sp. nov. and a new record and notes on the genus in Thailand

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Abstract—*Periconia notabilis* is described and illustrated as a new species discovered on a dead twig of *Delonix regia* in a terrestrial habitat, Pathum Thani Province, Thailand. It differs from all other *Periconia* species by its pale brown to brown spherical sheath around each conidiophore regeneration point. *Periconia obscurata* is reported from Thailand for the first time, and five other *Periconia* spp. are described and illustrated from Thai collections.

Key words—asexual fungi, microfungi, decaying plants, morphology, fungal taxonomy

Introduction

Periconia (*Pleosporales*, *Dothideomycetes*) is a polyphyletic genus. *Periconia* was introduced by Tode (1791) with *P. lichenoides* as the type species. Its systematics based on molecular phylogeny are unclear (Markovskaja & Kačergius 2014). *Periconia* species are known from various geographical locations and on different hosts, reported as herbaceous endophytes, plant pathogens on leaves and roots, and terrestrial saprobes found in mangrove, marine, and hypersaline ecosystems (Alias & Jones 2000; Cantrell et al. 2007; Earle 1902; Ellis 1971, 1976; El-Sharouny et al. 2009; Kohlmeyer 1977; Markovskaja & Kačergius 2014; Rao & Rao 1964; Whitton et al. 2012).

Periconia is characterized by conidiophores that are macronematous or sometimes micronematous, mononematous, branched or unbranched, sometimes setose, septate, erect, pale to dark brown, smooth or rarely

verruculose at the apical part of conidial head and conidiogenous cells that are monoblastic or polyblastic, ellipsoidal to spherical, discrete, formed on a stipe or branches, sometimes the conidiogenous cells arise from the lower part of the conidiophores. Conidia are blastocatenate, but maturing from basipetal, pale to dark brown, aseptate, spherical, ellipsoidal to oblong, smooth or ornamented (Ellis 1971, Markovskaja & Kačergius 2014).

Currently, the genus *Periconia* includes c. 40 accepted species (Kirk et al. 2008, Seifert et al. 2011).

During our continuing (2010–12) survey of saprophytic hyphomycetes associated with plant debris and saprobic micro-fungi from several collecting sites in Thailand, we found a new species described here as *Periconia notabilis* as well as specimens of six other *Periconia* species: *P. obscurata* (a new record for Thailand), *P. byssoides*, *P. cookei*, *P. echinochloae*, *P. lateralis*, and *P. sacchari*. Our descriptions and illustrations are based on morphological observations from the natural substrate, as attempts at isolation failed for several species.

Materials & methods

Our new species, *P. echinochloae, P. lateralis*, and *P. sacchari* were collected from decaying leaves and twigs in Pathum Thani Province; the three other *Periconia* species were collected in different provinces: *P. byssoides* and *P. obscurata* from Kanchanaburi Province and *P. cookei* from Chiang Rai Province. Samples were taken to the laboratory in polythene bags, rinsed in sterilized distilled water, and incubated in a moist chamber at room temperature (~20°C) for at least 14 days. Unfortunately, attempts to isolate and culture *P. notabilis* using a mono-spore technique failed. Because of limited type material and non-germinated conidia, the taxonomic description of the new species in this paper is based only on morphological characteristics without molecular data. Fungal cultures with successful isolation (*P. cookei*, *P. echinochloae*, *P. obscurata*, and *P. sacchari*) are maintained in BIOTEC Culture Collection, Thailand (BCC). Voucher specimens of the new species and other studied fungal permanent slides are deposited in the BIOTEC Bangkok Herbarium, Thailand (BBH). Drawings were made directly from slides using a compound microscope (Olympus BX50) equipped with a drawing tube.

Taxonomy

Periconia notabilis Chuaseehar., Somrith. & Boonyuen **sp. nov.** Plate 1

MycoBank MB 815470

Differs from other *Periconia* species by its subspherical, pale brown to brown sheath around the septum at the regeneration point of the conidiophore.

Type: Thailand, Pathum Thani Province, NSTDA, 14°04′33″N 100°36′21″E, on decaying twig of *Delonix regia* (Hook) Raf. (*Leguminosae*), 14 Jul. 2011, C. Chuaseeharonnachai (**Holotype:** BBH 39402).

Etymology: From the Latin *notabilis* (noteworthy), referring to the conspicuous sheath on the conidiophores.

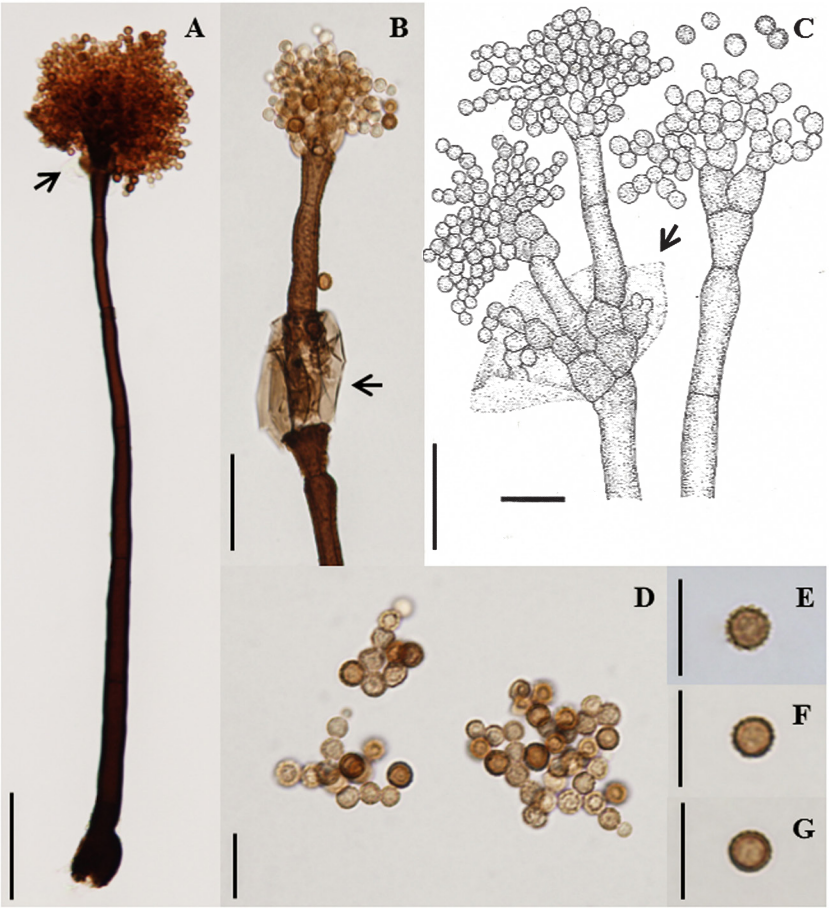

Plate 1. *Periconia notabilis* (holotype, BBH 39402). A. Conidiophores and head of conidia with sheath (arrow). B, C. Apical part of conidiophores showing sheath around the septa at the regeneration points (arrows), conidiogenous cells, and conidia. D. Branched chains of conidia formed blastically. E–G. Conidia. Scale bars: A = 50 µm; B, C = 25 µm; D–G = 10 µm.

Colonies on natural substrate effuse, dark, hairy. Mycelium mostly immersed. Conidiophores macronematous, mononematous, erect, 230–360 µm long, 10–20 µm thick at the base (x = 311 × 13.75 µm; n = 10), 5–7-septate, brown to reddish brown, thick-walled, verruculose especially below the apical conidial heads and smooth-walled at the basal part, often branched, and with regeneration. The primary branches are up to 15 × 7.5–10 µm; the secondary

branches are up to 10 × 7.5 µm, clavate-inflated, reddish brown, thick-walled, verruculose. Conidiophore regeneration is terminal and percurrent, leaving a subspherical, pale brown to brown, 30 × 22.5 µm diam. sheath. Conidiogenous cells monoblastic or polyblastic, discrete, subspherical to oval, smooth or verruculose, brown to reddish brown, arising directly from the apical cells of conidiophores, bearing simple or branched chains of conidia, 7.5–12.5 × 7.5 µm diam. Conidia catenate, spherical, pale brown to reddish brown, verruculose, aseptate, 3.5–5 µm diam. (x = 4.4 µm; n = 50).

Comment: *Periconia notabilis* resembles *P. minutissima* and *P. nigriceps* in having conidiophores with short branches at the apical head and having spherical verruculose conidia. However, *P. minutissima* differs by its conidiophore branches (at first adpressed like those of *P. notabilis* but later spreading) and by

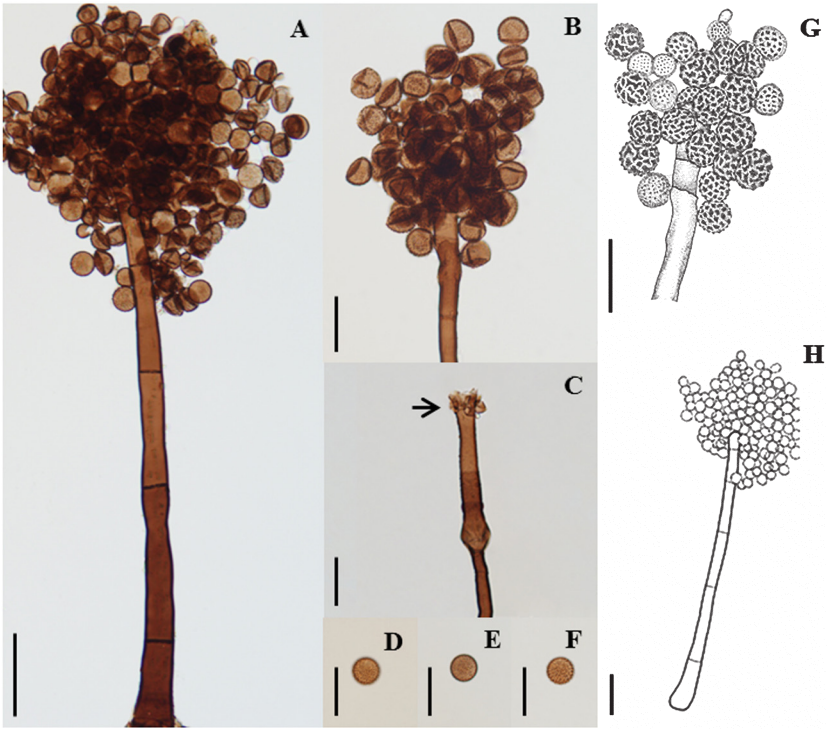

Plate 2. *Periconia byssoides* (BBH 39403). A, H. Conidiophores and head of conidia. B, G. Apical parts of conidiophores, conidiogenous cells, and conidia. C. Apical portion of conidiophore, arrow indicates a short apical cell cut off by a septum. D–F. Conidia. Scale bars: A, H = 50 µm; B–G = 25 µm.

its slightly larger (4–7 µm), straw-coloured to pale brown conidia (Ellis 1971); *P. nigriceps* differs by its smooth conidiophores and its larger conidia (6–8 µm; Earle 1902).

Periconia byssoides Pers., Syn. Meth. Fung.: 18 (1801) Plate 2

Colonies on natural substrate effuse, brown to dark brown, hairy. Mycelium mostly immersed, branched, septate, smooth, brown, 2.5 µm diam. Conidiophores macronematous, mononematous, erect, straight or slightly flexuous, 270–350 µm long, 15–17.5 µm thick at the base, 7.5 µm thick at the apex, unbranched, 4–5-septate, brown, thick-walled, verruculose immediately below the conidial heads and the lower to the basal part smooth-walled. Conidiogenous cells monoblastic or polyblastic, discrete, terminals, spherical, brown, smooth or verruculose. Conidia solitary or catenate, spherical, brown to reddish brown, verrucose, aseptate, 12.5–15 µm diam.

Specimen examined: **THAILAND, Kanchanaburi Province,** Suan Pa Sai Yok, on decaying unidentified leaves, 22 Aug. 2012, C. Chuaseeharonnachai (BBH 39403).

Comment: *Periconia byssoides* resembles *P. manihoticola* and *P. shyamala* in having unbranched conidiophores with a short apical cell cut off by a septum and conidiogenous cells formed over apex in collar around the septum. However, conidia of *P. byssoides* are much smaller than those of *P. manihoticola* (25–45 µm) and *P. shyamala* (16–22 µm; Ellis 1971).

Periconia cookei E.W. Mason & M.B. Ellis, Mycol. Pap. 56: 72 (1953) Plate 3

Colonies on natural substrate effuse, brown to dark brown, hairy. Mycelium mostly immersed, branched, septate, smooth, brown, 2.5 µm diam. Conidiophores macronematous, mononematous, erect, straight or curved, 870–880 µm long, 20–22.5 µm thick at the base, 12.5 µm thick at the apex, unbranched, 4-septate, brown to reddish brown, thick-walled, verruculose immediately below the conidial heads and the lower to the basal part smooth-walled. Conidiogenous cells monoblastic or polyblastic, discrete, terminal, spherical, brown to reddish brown, smooth or verruculose. Conidia solitary or catenate, spherical, brown to reddish brown, verrucose, aseptate, 15–17.5 µm diam.

Specimens examined: **THAILAND, Chiang Rai Province,** Wiang Pa Pao District, on decaying leaves of *Artocarpus altilis* (Parkinson) Fosberg (*Moraceae*), 26 Oct. 2012, S. Somrithipol (BBH 35459, BCC 60881; BBH 35460, BCC 60882).

Comment: *Periconia cookei* (Ellis 1971) is morphologically similar to *P. jabalpurensis* and *P. guangdongensis* in having long unbranched conidiophores with a swollen apex. However, the verrucose conidia of *P. cookei*

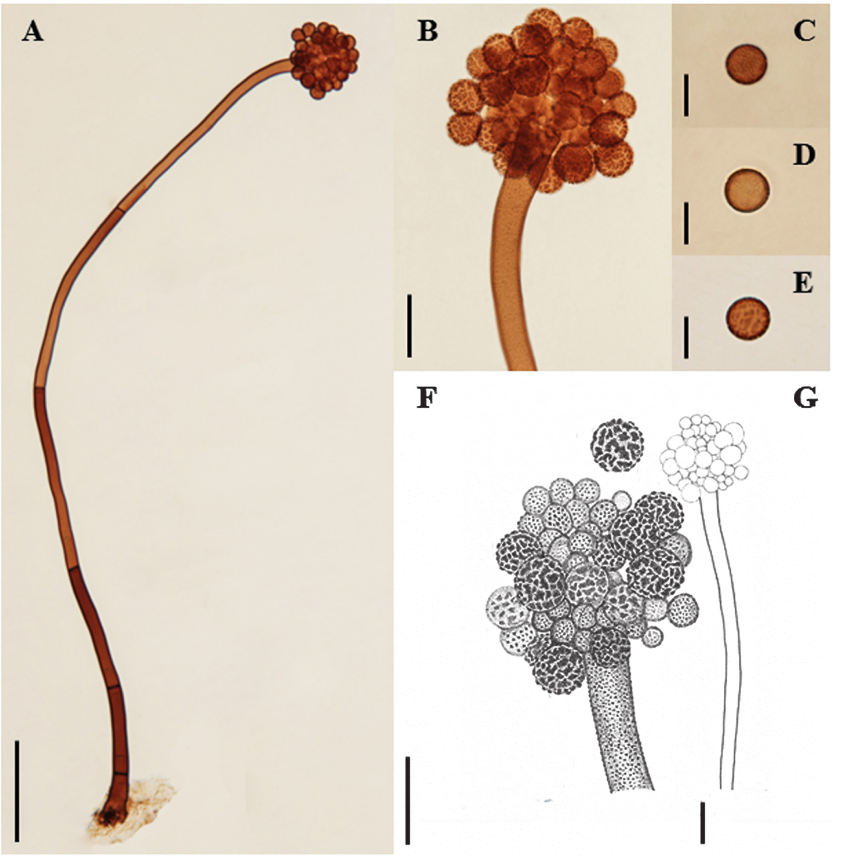

Plate 3. *Periconia cookei* (BBH 35460). A. Conidiophore and head of conidia. B, F, G. Conidiogenous cells and conidia. C–E. Conidia. Scale bars: A = 100 µm; B, F, G = 25 µm; C–E = 15 µm.

are larger than the echinulate conidia of *P. jabalpurensis* (8–12 µm; Ellis 1976) and *P. guangdongensis* (7–11 µm; Wu et al. 2015).

Periconia echinochloae (Bat.) M.B. Ellis, Demat. Hyphomyc.: 347 (1971) Plate 4

Colonies on natural substrate effuse, dark, hairy. Mycelium mostly immersed, branched, septate, smooth, brown. Conidiophores macronematous, mononematous, erect, straight or often curved, 540–800 µm long, 15–20 µm thick at the base, 7.5–10 µm thick at the apex, 7–8-septate, branched; always rising short lateral branches or formed in a group of 2–3 branches at the apex of the stipes with secondary and tertiary branches; the primary branches are up to

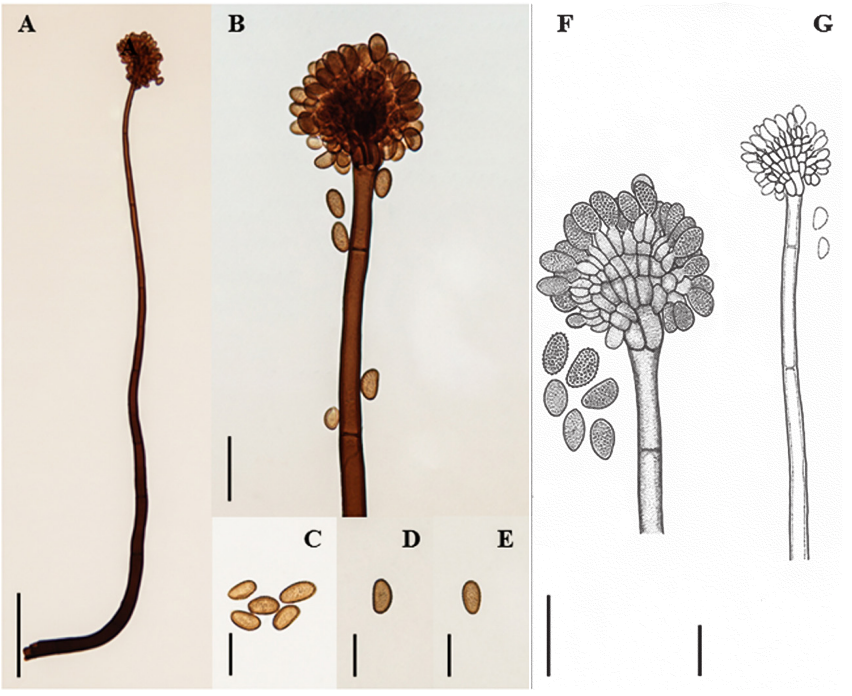

Plate 4. *Periconia echinochloae* (BBH 34960). A. Conidiophore and conidial head. B, F–G. Conidiogenous cells and conidia. C–E. Conidia. Scale bars: A = 100 µm; B, F–G = 25 µm; C–E = 15 µm.

30 × 6.25 µm; the secondary branches are up to 17.5 × 5 µm; the tertiary branches are 12.5 × 7.5 µm, brown to dark reddish brown toward the base, thick-walled, smooth, cylindrical, brown, thick-walled, smooth. Conidiogenous cells monoblastic or polyblastic, integrated, terminal, discrete, oval to cylindrical, brown to reddish brown, smooth. Conidia solitary, ellipsoidal to cylindrical, brown, verruculose, aseptate, 10.5–15 × 7.5–8.75 µm diam.

Specimens examined: **THAILAND, Pathum Thani Province,** NSTDA, on decaying leaves of *Saccharum officinarum* L. (*Poaceae*), 28 Aug. 2012, S. Somrithipol (BBH 34960, BCC 62335; BBH 34961, BCC 60844; BBH 34962, BCC 60845); Thanyaburi District, on decaying leaves of *Cymbopogon citratus* (DC.) Stapf (*Poaceae*), 27 Aug. 2012, S. Somrithipol (BBH 35457, BCC 60879).

Comment: *Periconia echinochloae* (Ellis 1971) is morphologically similar to *P. trachycarpicola* in having branched conidiophores and ellipsoidal conidia, but *P. trachycarpicola* has smaller conidia (6–11× 5–7 µm; Taylor & Hyde 2003).

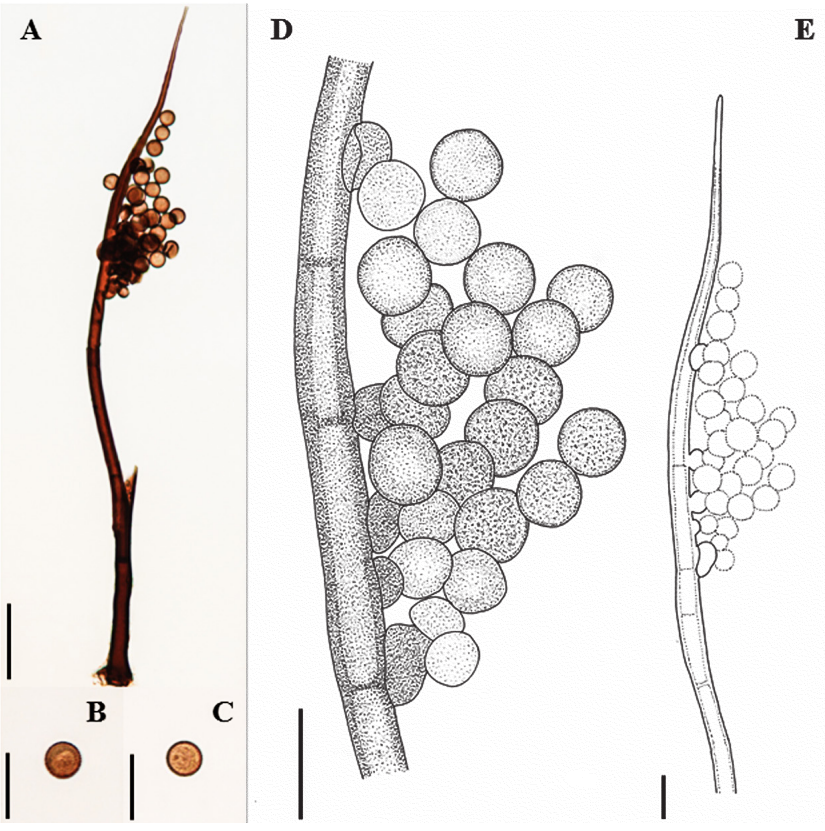

Plate 5. *Periconia lateralis* (BBH 36934). A. Conidiophore, conidiogenous cells, and conidia. B, C. Conidia. D, E. Conidiogenous cells and conidia. Scale bars: A = 50 µm; B–E = 20 µm.

Periconia lateralis Ellis & Everh., J. Mycol. 2: 104 (1886) Plate 5

Colonies on natural substrate effuse, brown to dark brown, hairy. Mycelium mostly immersed, branched, septate, smooth, brown. Conidiophores macronematous, mononematous, with setiform apices, erect, often curved, 300–440 µm long, 17.5–20 µm thick at the base, tapering to 2.5–5 µm at the apex, unbranched, 6–9 septate, brown to reddish brown toward the base, thick-walled, smooth. Conidiogenous cells monoblastic or polyblastic, discrete, directly formed in the middle part of the conidiophores, unilateral, spherical to oval, brown to reddish brown, smooth. Conidia solitary or catenate, spherical, brown, verruculose, aseptate, 10.5–15 µm diam.

Specimen examined: **THAILAND, Pathum Thani Province,** Thanyaburi District, on decaying leaves of *Brachiaria mutica* (Forssk.) Stapf (*Poaceae*), 27 Aug. 2012, S. Somrithipol (BBH 36934).

Comment: Morphologically, *P. lateralis* (Ellis 1971, Ellis & Everhart 1886) most closely resembles *P. fusiformis* and *P. pseudolateralis* in having solitary conidiophores with conidiogenous cells formed below the setiform apices. These species are otherwise distinguished by the branching system of conidiophores, the position of the conidiogenous cells, and conidial morphology. Conidiophores of *P. pseudolateralis* consist of fertile branches spirally arranged around the stipe, and the conidia are spiny and smaller (6–9 µm; Hoog & Rao 1975). The conidiophores of *P. fusiformis* consist of

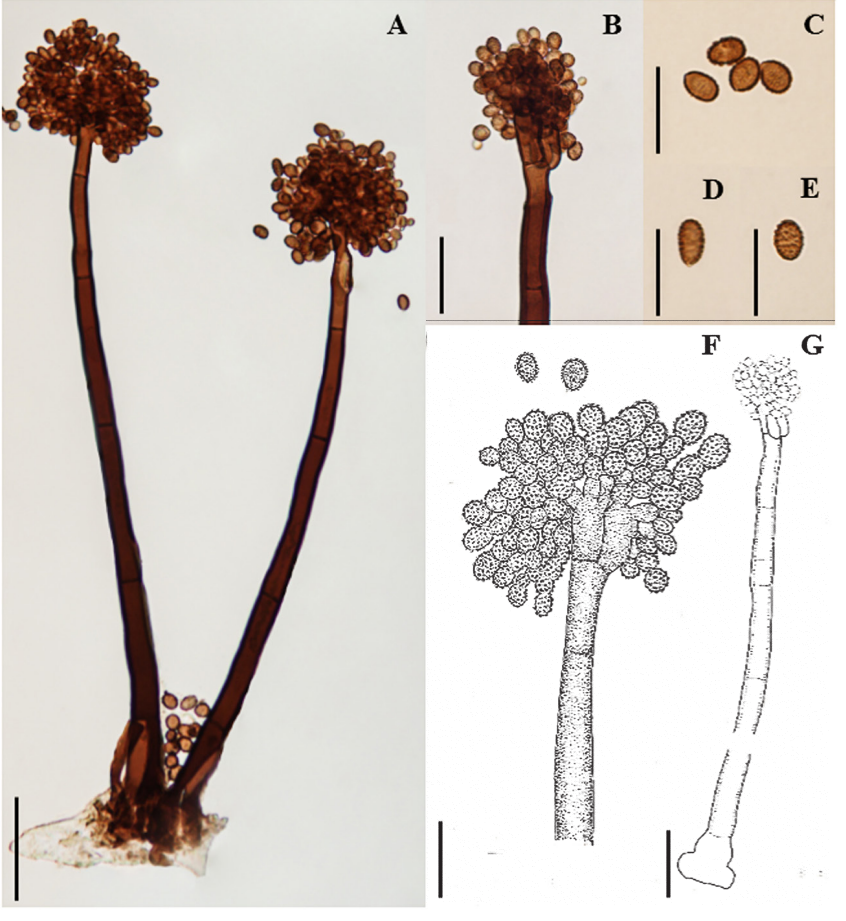

Plate 6. *Periconia obscurata* (BBH 39404). A. Conidiophores and conidial head. B, F. Conidiogenous cells and conidia. C–E. Conidia. F, G. Conidiophore, conidiogenous cells, and conidia. Scale bars: A, G = 50 µm; B, F = 25 µm; C–E = 20 µm.

fertile branches formed on all sides of the stipe, and the conidia are verrucose and smaller (9.5–13 µm; Muntañola-Cvetković et al. 1998).

Periconia obscurata Kirschst., Ann. Mycol. 34: 195 (1936) Plate 6

Colonies on natural substrate effuse, dark brown, hairy. Mycelium mostly immersed, branched, septate, smooth, brown, 5 µm diam. Conidiophores macronematous, mononematous, erect, straight or slightly flexuous, 200–350 µm long, 12–17.5 µm thick at the base, 7.5 µm thick at the apex, branched; usually rising short lateral branches at the apex, 4–6 septate, brown to dark brown toward the base, thick–walled, smooth. The apical branches are up to 20 × 6.25–7.5 µm, cylindrical, brown, thick-walled, smooth. Conidiogenous cells monoblastic or polyblastic, discrete, terminal, subspherical to oval, brown to dark brown, verruculose, 6.25–7.5 × 5–7.5 µm diam. Conidia solitary or catenate, ellipsoidal or oval, brown, verruculose, aseptate, 6.25–10 × 5–6.25 µm diam.

Specimen examined: **THAILAND, Kanchanaburi Province,** Suan Pa Sai Yok, on decaying unidentified twig, 22 Aug. 2012, C. Chuaseeharonnachai (BBH 39404, BCC 61896).

Comment: *Periconia obscurata* is described here as a new record for Thailand. The morphological characters of our specimen are consonant with the description given by Kirschstein (1936) with the exception of length and branching of conidiophores. The conidiophores of Kirschstein's holotype were smaller (200–225 × 12–16 µm) and branching was not reported. This suggests that branching and length of conidiophores are not crucial characters to distinguish between species.

Periconia sacchari J.R. Johnst., J. Dept. Agric. Porto Rico 1: 225 (1917) Plate 7

Colonies on natural substrate effuse, dark brown, hairy. Mycelium mostly immersed, branched, septate, smooth, brown. Conidiophores macronematous, mononematous, erect, straight or slightly flexuous, 370–400 µm long, 17.5–20 µm thick at the base, tapering to 6.25–10 µm at the apex, branched; producing lateral branches or formed in a group of short 2–3 branches at the apex, 3–4-septate, brown to reddish brown toward the base, thick-walled, smooth. Branches mainly producing secondary, and tertiary branches; the primary branches are up to 92.5 × 5–6.25 µm; the secondary branches are 10–12.5 × 5 µm; the tertiary branches are 10 × 6.25 µm, cylindrical, brown, thick-walled, smooth. Conidiogenous cells monoblastic, discrete, terminal, ellipsoidal, brown to reddish brown, smooth, 10–12.5 × 5–7.5 µm diam. Conidia solitary, oblong, brown, verrucose, aseptate, 16.25–17.5 × 7.5–8.75 µm diam.

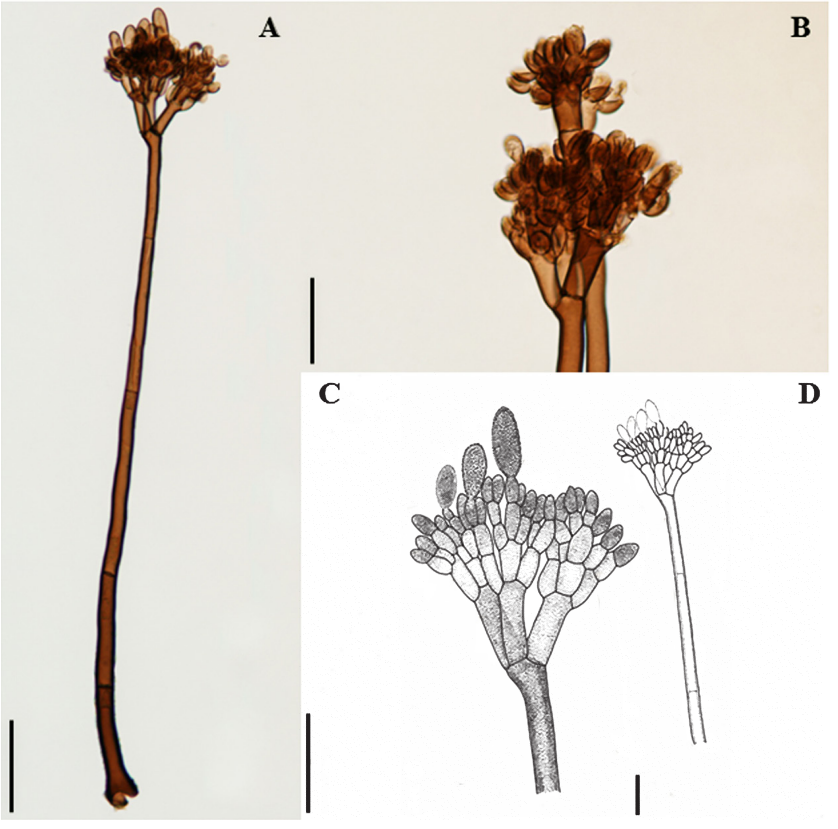

Plate 7. *Periconia sacchari* (BBH 35458). A. Conidiophore and conidial head. B–D. Conidiogenous cells and conidia. Scale bars: A = 50 µm; B–D = 25 µm.

Specimen examined: **THAILAND, Pathum Thani Province,** Thanyaburi District, on decaying leaves of *Cymbopogon citratus*, 27 Aug. 2012, S. Somrithipol (BBH 35458) – BCC 60880 culture in BCC.

Comment: *Periconia sacchari* (Ellis 1971) differs from other *Periconia* species in having oblong or cylindrical conidia. *Periconia nilagirica* also has elongate conidia, but they are echinulate, with a similar range of sizes but extending to a longer maximum (14–21 × 7–9.8 µm; Subramanian 1957, 1971).

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